

Amendments to the Specification:

After the title, please insert the following subheading and paragraph:

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is entitled to the benefit of and incorporates by reference essential subject matter disclosed in International Application No. PCT/SE03/00110 filed on January 23, 2003 and Swedish Patent Application No. 0200872-0 filed on March 21, 2002.

Before paragraph [0002], please insert the following subheading:

FIELD OF THE INVENTION

Before paragraph [0003], please insert the following subheading:

BACKGROUND OF THE INVENTION

Please replace paragraph [0003] with the following amended paragraph:

[0003] A centrifugal separator of this kind may be used to remove from a liquid body having a free liquid surface a thin surface layer of the liquid body and thereafter directly separate from each other two liquids with different density, e.g. oil and water, included in ~~said~~the surface layer.

Please replace paragraphs [0005-0006] with the following amended paragraphs:

[0005] In WO 00/59639 a centrifugal rotor of the kind here in question is proposed to be used together with a special device for removal of a surface layer from a liquid body. The pumping member of the centrifugal rotor in this case is arranged to pump liquid into the rotor from ~~said~~the special device and, thus, not to pump liquid into the rotor directly from ~~said~~the liquid body. A special device of this kind makes the entire separation equipment complicated and expensive.

[0006] In WO 00/59640 a centrifugal rotor having a pumping member of the initially defined kind, instead, is proposed to be provided with a special sealing

device adapted to prevent liquid being pumped up from ~~said~~the liquid body from flowing on the outside of the pumping member and being thrown back therefrom to the liquid body. This would cause turbulence in the surface layer of the liquid body to be removed therefrom and to be treated in the centrifugal rotor. Thus, also in this case a special device is required in addition to the actual pumping member, i.e. ~~said~~the sealing device, for the pumping of liquid into the centrifugal rotor.

Please replace paragraph [0008] with the following amended paragraph:

[0008] A main object of the present invention is to provide a centrifugal separator having a ~~very~~-simple and inexpensive centrifugal rotor of the initially defined kind. Another object is to provide such a centrifugal separator which ~~as effectively as possible~~can effectively remove a surface layer from a liquid body and pump it into the centrifugal rotor without causing substantial turbulence in the surface layer while this is still on the liquid body.

Before paragraph [0009], please insert the following subheading:

SUMMARY OF THE INVENTION

Please replace paragraphs [0009-0018] with the following amended paragraphs:

[0009] These objects may be obtained by a centrifugal separator of the initially defined kind, ~~which is characterized in that the~~ having a pumping member on its outside ~~has that defines~~ a pumping surface facing away from the rotational axis, extending ~~mainly rotational-substantially~~ symmetrically around the rotational axis and being arranged to have contact with a free liquid surface on ~~said~~the liquid body in an area extending around the pumping member[.].

[0010] ~~that~~The pumping surface on the outside ~~of the pumping member thereof~~, at least along a part of the axial extension of the pumping member ~~in said area~~, has a generatrix forming an angle with the rotational axis in a way such that the pumping member along ~~said~~the part of its axial extension has an increasing diameter from below and upwards, so that upon rotation of the rotor liquid will flow upwards from the free liquid surface on the outside of the pumping member[. and].

[0011] ~~that~~ The rotor delimits a receiving space situated so that it receives liquid that upon rotation of the rotor has been brought to flow upwards from the free liquid surface on the outside of the pumping member.

[0012] To make possible an acceptable pumping capacity without liquid, flowing upwards along the pumping surface, being thrown away from it, said generatrix should form an angle greater than 30° with the rotational axis. No benefit, as to[,] pumping capacity[,] is made at an angle exceeding about 35°. Preferably, the generatrix forms an angle of between 30° and 45°, preferably 35°, with the rotational axis.

[0013] In order to safely ~~to~~ receive liquid[,] which is pumped upwards along the pumping surface of the pumping member, the rotor body, during operation of the rotor, ~~suitably extends downwards~~ downwardly to a level such that the rotor body surrounds an upper part of the pumping surface somewhat above the free liquid surface.

[0014] It is[,] possible to allow liquid being pumped upwards along the pumping surface to leave the pumping surface and be thrown some ~~distance~~ through the air before being caught by the rotor body. However, to avoid unnecessary splitting of liquid components, which later shall be separated from each other in the centrifugal rotor, the pumping member ~~suitably~~ has a continuous surface extending from the pumping surface into a part of the receiving space of the rotor, which is arranged to contain liquid during operation of the rotor. The liquid may then flow along this surface into the receiving space under as little turbulence as possible.

[0015] In this connection, ~~it can be mentioned that~~ it is previously known to use a conical pumping member to pump a liquid mixture of components upwards from the surface of a liquid body to cause separation of the components. Such technique is known for instance through SU 1 382 496 A1 and SU 1 180 079 A. Here, though, the components are separated from each other by being thrown away from the conical pumping member at different axial levels thereof.

[0016] In a preferred embodiment of the invention a free liquid surface will be maintained in the separation chamber of the centrifugal rotor at a first radial distance from the rotational axis. For obtainment of a separation, as undisturbed as possible in the separation chamber ~~said, the~~ receiving space preferably communicates with the separation chamber at a second radial distance from the rotational axis greater than ~~said the~~ first radial distance.

[0017] According to the invention the centrifugal separator also includes a driving device for rotation of the centrifugal rotor. The centrifugal rotor and the pumping member may be separately supported by this driving device. However, in a practical embodiment of the invention, only the pumping member is connected directly with the driving device, so that it is supported thereby, whereas the rotor body is supported by the pumping member and thus only indirectly by the driving device. Then, the rotor body may be arranged to be removed from the pumping member, e.g. for cleaning, without the ~~later~~latter having to be released from the driving device.

[0018] In a preferred embodiment of the invention the separation chamber has two outlets at different radial distances from the rotational axis of the rotor for the ~~respective~~respectively discharging of two separated liquids with different densities.

Before paragraph [0019], please insert the following subheading.

BRIEF DESCRIPTION OF THE DRAWING

Before paragraph [0020], please insert the following subheading.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please replace paragraphs [0020-0027] with the following amended paragraphs:

[0020] Fig. 1 shows a centrifugal separator 1 supported by means of floats 2, bars 3 and a supporting member 4 directly above the surface of a liquid body 5. The liquid surface is illustrated by means of a small triangle. The centrifugal separator ~~in this way~~ is arranged to remove, from the liquid body 5, a thin surface layer, comprising oil and water[[,]] and to separate the oil and the water from each other.

Separated oil is shown flowing through a pipe 6 to a collecting tank 7, whereas separated water is shown being reconducted to the liquid body through a conduit 8. An electrical connection 9 is shown as an illustration of how the centrifugal separator is meant to be driven.

[0021] Fig. 2 shows an axial section through the centrifugal separator 1 in Fig. 1. The centrifugal separator includes a stationary supporting device 10 that, in turn, is arranged to be supported by, and be suspended from, the supporting member 4 in the way as illustrated in Fig. 1. The supporting device 10 supports an electric motor 11, which has a ~~downwards~~downwardly directed driving shaft 12 arranged to rotate around a vertical rotational axis R. A central pumping member 13 is attached to the driving shaft 12 and extends ~~downwards~~downwardly such that its lowermost part dips down into the liquid body 5.

[0022] The pumping member 13 supports a rotor body 14 surrounding the pumping member and extending ~~downwards~~downwardly to a level just above the liquid surface of the liquid body 5. Between the pumping member 13 and the rotor body 14 a separation chamber 15 is delimited. An upper part of the pumping member 13 forms a partition 16 between the separation chamber 15 and a space 17 above the pumping member.

[0023] On top of the pumping member 13 a sleeve formed member 18 is mounted, surrounding ~~said~~the space 17. The partition 16 and the sleeve formed member 18 delimits, by means of radially inwardly directed annular flanges 19 and 20, two annular chambers 21 and 22, ~~[[respectively,]]~~ which constitute parts of the space 17. A first channel 23 extends through the partition 16 from a radially outer part of the separation chamber 15 to the annular chamber 21. A second channel 24 extends through the partition 16 from a radially inner part of the separation chamber 15 to the annular chamber 22.

[0024] The pumping member 13 (with its partition 16), the rotor body 14 and the sleeve formed member 18 form together a centrifugal rotor~~[[, which is].~~ The centrifugal rotor is rotatable by means of the driving shaft 12 of the motor 11. The upper part of the centrifugal rotor is surrounded by the stationary supporting device 10.

[0025] The annular chamber 21 has a draining channel 25 extending radially away from the chamber 21 through the partition 16 and opening on the outside of the centrifugal rotor just described. The annular chamber 22 may be drained by means of a stationary ~~so-called~~ draining tube 26 extending from above through the supporting device 10 into the space 17 and further out in the chamber 22.

[0026] The stationary supporting device 10 forms an annular groove 27 extending all around the centrifugal rotor and ~~being open~~ opening towards the rotor through an annular slot 28 that is situated at the same axial level as the opening of the draining channel 25. The groove 27 has an outlet 29.

[0027] The lowermost part of the pumping member 13 is formed as a solid conical body 30 having a conical pumping surface 31. A part of the body 30 extends out through a downwardly facing central opening 32 in the rotor body 14. Only the tip of ~~said~~ the part of the body 30 is ~~dipping~~ dips down into the liquid body 5. A narrow annular slot 33 is left between the conical body 30 and the edge of the opening 32.